IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	Schnetzka, et al.	:	Confirmation No.: 6783
Application No.:	10/728,157	:	Group Art Unit: 3746
Application Filed:	12/04/2003	:	Examiner Vidayathil, Tresa V.

For: SYSTEM AND METHOD FOR NOISE ATTENUATION OF SCREW COMPRESSORS

APPEAL BRIEF

MAIL STOP APPEAL BRIEF-PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Appeal Brief is being filed within two months from the Notice of Appeal submitted November 15, 2007, pursuant to 37 C.F.R. §41.37(a). This Appeal Brief is being submitted in response to a Final Office Action dated August 15, 2007.

Appellant hereby authorizes the Fee for Filing a Brief in Support of an Appeal of $500.00 and any other charges necessary for consideration of this appeal to be charged to Deposit Account No. 50-1059. An accompanying Fee Transmittal is provided with this Appeal Brief authorizing the charge of the above fees to Deposit Account No. 50-1059.

Real party in interest

The real party of interest in this pending application is York International Corporation, 631 South Richland Avenue, York, PA 17403, who is an Assignee of the inventors' interest, which assignment has been duly recorded in the United States Patent and Trademark Office.

Related appeals and interferences

Appellant, Appellants' legal representative and Assignees are not aware of any directly related co-pending applications or any other appeals or interferences that will directly affect or

be directly affected by or have a bearing on the Board of Patent Appeals and Interference's decision in this pending appeal.

Status of claims

Claims 1-7 were filed in the original application. During prosecution, claims 1-5 and 7 were amended, and new claim 8 was added. Claims 1-8 are pending, and claims 1-8 are rejected. Applicant appeals from the final rejection of claims 1-8 of the Final Office Action mailed August 15, 2007 (hereinafter "Final Office Action").

The appealed claims are set forth in Appendix I.

Status of amendments

A Response to Final Office Action, including proposed amendments to the claims, was filed on November 15, 2007. No Advisory Action has been issued, and for purposes of this appeal, the amendments made in response to the final rejection are not considered to be entered.

Summary of claimed subject matter

There are three independent claims, 1, 5 and 8. Claims 5 and 8 include means plus function elements, as described at the end of this section.

Independent Claim 1 is directed to a method for attenuating noise in at least one heating or cooling system. The steps include providing at least two compressors (12, 14) including a reference compressor (12). The at least two compressors (12, 14) have a selectably controllable rotational speed (Par. [0013]: 4-5 & 11-14] and a selectably controllable phase of operation (Par. [0019]); selectably controlling the rotational speed and the phase of operation of each compressor of the at least two compressors (Par. [0013]: 4-5 & 11-14]; Par. [0019]); sensing pressure pulses associated with each compressor of the at least two compressors (Par. [0019]: 1-8); determining the rotational speed and the phase of operation of each compressor of the at least two compressors based on the sensed pressure pulses; controlling the rotational speed of the at least two compressors at a predetermined rotational speed that is substantially the same for each of the at least two compressors; and shifting the phase of operation of at least one compressor (12, 14) of the at least two compressors (12, 14) so that outlet pressure pulses operatively

produced by the at least two compressors are substantially evenly spaced. (See, e.g., (Par. [0006]); (Par.[0019]: 11-15); (Par. [0020]); Figure 2).

Independent Claim 5 is directed to a system for attenuating noise in at least one heating or cooling system 10. The system includes at least two compressors (12, 14); a means of control (56) for selectably controlling the rotational speed and the phase of operation of each compressor (12, 14) of the at least two compressors (12, 14); a sensing means 48,50) for sensing pressure pulses (52, 54) associated with each compressor (12, 14) of the at least two compressors (12, 14); the means of control 56 configured to determine the rotational speed and the phase of operation of each compressor of the at least two compressors (12, 14) based on the sensed pressure pulses, and to control: the rotational speed of the at least two compressors (12, 14) at a predetermined rotational speed that is substantially the same and the phase of operation of the at least two compressors (12, 14) so that outlet pressure pulses operatively produced by the at least two compressors (12, 14) are substantially evenly spaced . (See, e.g., (Par. [0007]); (Par.[0019]: 11-15); (Par. [0020]); Figure 2)

Independent Claim 8 is directed to a method for attenuating noise in at least one heating or cooling system, the steps comprising: providing at least two compressors (12, 14); selectably controlling the rotational speed and the phase of operation of each of the at least two compressors (12, 14); sensing pressure pulses (52, 54) associated with each compressor; determining the rotational speed and the phase of operation of each of the at least two compressors (12, 14) based on the sensed pressure pulses; controlling by the means of control 56 the rotational speed of the at least two compressors (12, 14) at a predetermined rotational speed that is substantially the same for each of the at least two compressors (12, 14) (See, e.g., Par. [0006], [0007] and [0019]; and Fig. 2).; and shifting the phase of operation of at least one compressor of the at least two compressors (12, 14) so that outlet pressure pulse pulses operatively produced by each of the at least two compressors (12, 14) are substantially evenly spaced (See, e.g., Par. [0019] and Par. [0020]; and Fig. 2); wherein the composite pressure pulse frequency is a factor of "n" times higher than the frequency between successive outlet pulses of each compressor, "n" being a total number of the at least two compressors (12, 14) (See, e.g., Par. [0020]).

In claims 5 and 8, there are two means plus function terms. First, a means of control 56 is embodied as a controller 56 that includes logic devices, such as a microprocessor or other electronic means, for the generation of speed control signals 46 and 48 for controlling the operating parameters of compressors 12, 14 by controlling their respective inverters 42, 44 and motors 21, 23. AC electrical power received from an electrical power source 40 is rectified from AC to DC, and then inverted from DC back to variable frequency AC by inverters 42, 44 for driving respective compressor motors 21, 23. The compressor motors are typically AC induction, but might also be Brushless Permanent Magnet or Switched Reluctance motors. (Par. [0013])

Second, a sensing means is also claimed, the structure being disclosed as sensors 48, 50 that monitor refrigerant gas parameters, such as pressure pulses, passing through respective discharge lines 22, 24 providing parameter inputs to a controller 56 via respective lines 58, 60. (Par. [0013])

Ground of rejection to be reviewed on appeal

Ground 1. The Examiner rejected claims 1-8 under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.

Ground 2. The Examiner rejected claims 1, 5, and 8 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Ground 3 The Examiner has objected to the amendment filed May 21, 2007 under 35 U.S.C. 132(a) because it introduces new matter into the disclosure.

Argument

Ground 1. Claims 1-8 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.

The Examiner stated:

> Amended claims 1, 5, and 8 claim that the means of control used to control the phase of operation so that the outlet pressure pulse operatively produced by each of the remaining of the at least two compressors is substantially evenly spaced between successive outlet pulses operatively produced by the reference compressor. It is not disclosed in the specification how the phase of operation is controlled or shifted to produce the claimed result. As noted on the Interview Summary mailed on February 23, 2007, the specification describes the components or structure used by the Applicant and the intended results desired by the Applicant. However, the Applicant does not disclose how to use those components to achieve the stated results in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected to make and/or use the invention. For example, the Applicant discloses that the combination of the controller and inverter is used to change the magnitude of the speed signal sent to the motor to create the phase shift. Then, a sensor senses the actual phase shift. However, it is unclear how such a precise phase shift is accomplished so easily. There is no clear delineation of all the steps necessary to create the phase shift.

Originally, the following was included as part of the 35 U.S.C. 112, paragraph 1 rejection:

> > Claims 1 and 5 claim a sensing means for sensing the rotational speed and the phase of operation of each of the compressors. The specification discloses a sensor or sensing means for sensing the rotational speed and the phase of operation of each of the compressors (pg. 3, ll. 3-4 and pg 3, para. 7, ll. 6-7). The specification also discloses sensors monitoring refrigerant gas parameters, such as pressure pulses (pg. 4, para. 13, ll. 9-10). It is not clear how the system is sensing the rotational speed and phase as claimed. Instead, it seems more likely that the system is sensing the pressure and calculating the rotational speed and phase of operation of the compressors.

In response, the Applicant added the following language to claims 1 and 5 and new claim 8: determining or configured to determine "the rotational speed and the phase of operation of each compressor of the at least two compressors

based on the sensed pressure pulses." The new language was only added to the claims, and the specification contradicts this material in that the specification continuously indicates that a sensor senses the rotational speed and phase of operation of each of the compressors (first mentioned in the specification, pg. 3, 11. 2-3). Prior to the amendment filed on May 21, 2007, no part of the disclosure indicated that the rotational speed and the phases of operation were determined based on the sensed pressure pulses.

For the above reasons, claims 1-8 are not enabled.

Claims 1, 5 and 8

"The enablement provision of the Patent Act, 35 U.S.C. §112, paragraph 1, requires that the patentee provide a written description of the invention "in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same." 35 U.S.C. §112, 1 (2000). The purpose of this requirement is to ensure that 'the public knowledge is enriched by the patent specification to a degree at least commensurate with the scope of the claims.' Accordingly, ...the specification must provide sufficient teaching such that one skilled in the art could make and use the full scope of the invention without undue experimentation. 'The key word is 'undue,' not 'experimentation.'' Wands, 858 F.2d at 737 (citation omitted). That is, the specification need only teach those aspects of the invention that one skilled in the art could not figure out without undue experimentation. See, e.g., Nat'l Recovery Techs., 166 F.3d at 1196 ("The scope of enablement ... is that which is disclosed in the specification plus the scope of what would be known to one of ordinary skill in the art without undue experimentation."); Wands, 858 F.2d at 736-37 ("Enablement is not precluded by the necessity for some experimentation such as routine screening.")." Warner-Lambert Co. v. Teva Pharmaceuticals USA Inc., 418 F.3d 1326, 75 USPQ2d 1865, (Fed. Cir. 2005) (citations omitted).

The Examiner incorrectly stated: "Prior to the amendment filed on May 21, 2007, no part of the disclosure indicated that the rotational speed and the phases of operation were determined based on the sensed pressure pulses." Applicants pointed out to the Examiner that paragraph [0013] describes how the phase of operation is controlled or shifted to produce the claimed result. Paragraph [0013] of the specification states in pertinent part:

> . . . Sensors 48, 50 monitor refrigerant gas parameters, such as *pressure pulses*, passing through respective discharge lines 22, 24 providing parameter

> inputs to a controller 56 via respective lines 58, 60. The controller 56 includes logic devices, such as a microprocessor or other electronic means, for the generation of *speed control signals* 46 and 48 for *controlling the operating parameters of compressors* 12, 14 by controlling their respective inverters 42, 44 and motors 21, 23. AC electrical power received from an electrical power source 40 is rectified from AC to DC, and then inverted from DC back to variable frequency AC by inverters 42, 44 for driving respective compressor motors 21, 23.
> [Emphasis added]

The Examiner indicated that "the Applicant discloses that the combination of the controller and inverter is used to change the magnitude of the speed signal sent to the motor to create the phase shift. Then, a sensor senses the actual phase shift. However, it is unclear how such a precise phase shift is accomplished so easily. There is no clear delineation of all the steps necessary to create the phase shift."

The specification indicates throughout that the method employs a continuous feedback from sensors to the controller, for the controller to continuously monitor and change the frequency and voltage applied to compressors. See Specification, paragraph [0016]. The controller 56 monitors the occurrence of pressure pulses from the lead or reference compressor 12 by use of sensor 50. From this information, the controller 56 varies the magnitude of speed control signal 47 which is applied to inverter 44 to synchronize the feedback pressure pulses emanating from the lag compressor 14 via sensor 50 with respect to frequency and simultaneously interleave the pulsations with respect to the phase of the pressure pulsations sensed by sensor 48. Referring to Fig. 2, which depicts the pressure pulses as square waves, wave 52 corresponding to lead compressor 12 pressure pulses and wave 54 corresponding to lag compressor 14 pressure pulses. Preferably, the phase of wave 54 is shifted such that the pulse of wave 54 is positioned substantially equidistant between successive pulses of wave 52. This shifting preferably produces a resultant or effective output wave that is twice the frequency of wave 52 having a wavelength half that of wave 52. See paragraph [0019]. Reference to Figure 2 reveals that the output pressure pulses are respectively spaced with respect to time and pressure, indicating the rotational speed and frequency parameters of the respective compressors.

The description above clearly indicates to one skilled in the art all of the steps necessary to achieve the phase shift, and to produce substantially evenly spaced output pressure pulses. Specifically, by varying the magnitude of the speed control signal to the lag compressor, based on a signal from the pressure pulse sensor to the controller. Since varying the magnitude of the speed control signal applied to the inverter varies the speed of the lag compressor corresponding

to the frequency of the pressure pulses, it is clear that varying the speed control signal shifts the phase of the lag compressor pressure pulses relative to the pressure pulses generated by the reference compressor. The Examiner's statement above that it is "not clear how such a precise phase shift is accomplished so easily . . . (and) [t]here is no clear delineation of all the steps necessary to create the phase shift", indicates that the Examiner fails to appreciate that the steps are indeed clearly delineated, and that one skilled in the art would understand that to vary one compressor relative to the other causes the respective output pulses to shift until the feedback controlled parameters are satisfied – i.e., the speed control signal requires no further adjustment. Applicants submit that the disclosure is sufficient to enable one skilled in the art to practice the invention without undue experimentation, and that there is a "clear delineation of all the steps necessary to create the phase shift."

Therefore, Applicants respectfully submit that claims 1-8are enabled.

Ground 2.

The Examiner rejected Claims 1, 5, and 8 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Examiner stated:

> The term "substantially in claims 1, 5, and 8 is a relative term which renders the claim indefinite. The terms "substantially the same" and "substantially evening spaced" are not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Therefore, for purposes of examination the terms "substantially the same" and "substantially evenly spaced" will be interpreted as "the same" and "evenly spaced" respectively.

Applicants respectfully traverse the Examiner's rejection under 35 U.S.C. § 112, Second Paragraph.

Claims 1, 5 and 8

MPEP Section 2173.05(b) part D discusses the use of the term "substantially" in a claim:

D. "Substantially"

The term "substantially" is often used in conjunction with another term to describe a particular characteristic of the claimed invention. It is a broad term. In re Nehrenberg, 280 F.2d 161, 126 USPQ 383 (CCPA 1960). The court held that the limitation "to substantially increase the efficiency of the compound as a copper extractant" was definite in view of the general guidelines contained in the specification. In re Mattison, 509 F.2d 563, 184 USPQ 484 (CCPA 1975). The court held that the limitation "which produces substantially equal E and H plane illumination patterns" was definite because one of ordinary skill in the art would know what was meant by "substantially equal." Andrew Corp. v. Gabriel Electronics, 847 F.2d 819, 6 USPQ2d 2010 (Fed. Cir. 1988).
MPEP §2703.05(b) D.

Further, case law provide that "[w]hile reference to intrinsic evidence is primary in interpreting claims, the criterion is the meaning of words as they would be understood by persons in the field of the invention. Patent documents are written for persons familiar with the relevant field; the patentee is not required to include in the specification information readily understood by practitioners, lest every patent be required to be written as a comprehensive tutorial and treatise for the generalist, instead of a concise statement for persons in the field. Thus resolution of any ambiguity arising from the claims and specification may be aided by extrinsic evidence of usage and meaning of a term in the context of the invention. The question is not whether the word "substantially" has a fixed meaning … but how the phrase would be understood by persons experienced in this field of mechanics, upon reading the patent documents.

* * *

Expressions such as "substantially" are used in patent documents when warranted by the nature of the invention, in order to accommodate the minor variations that may be appropriate to secure the invention. Such usage may well satisfy the charge to "particularly point out and distinctly claim" the invention, 35 U.S.C. §112, and indeed may be necessary in order to provide the inventor with the benefit of his invention. In Andrew Corp. v. Gabriel Elecs. Inc., 847 F.2d 819, 821-22, 6 USPQ2d 2010, 2013 (Fed. Cir. 1988) the court explained that usages such as "substantially equal" and "closely approximate" may serve to describe the invention with precision appropriate to the technology and without intruding on the prior art. The court again explained in Ecolab Inc. v. Envirochem, Inc., 264 F.3d 1358, 1367, 60 USPQ2d 1173, 1179 (Fed. Cir. 2001) that "like the term 'about,' the term 'substantially' is a descriptive term commonly used in patent claims to 'avoid a strict numerical boundary to the specified parameter,'" quoting Pall Corp. v. Micron Separations, Inc., 66 F.3d 1211, 1217, 36 USPQ2d 1225, 1229 (Fed. Cir. 1995).

It is well established that when the term "substantially" serves reasonably to describe the subject matter so that its scope would be understood by persons in the field of the invention, and to distinguish the claimed subject matter from the

> prior art, it is not indefinite. Understanding of this scope may be derived from extrinsic evidence without rendering the claim invalid. The summary judgment record offered no basis for departing from these general rules. Thus the usage "substantially constant wall thickness" does not of itself render the claims of the '315 patent indefinite.
> Verve LLC v. Crane Cams Inc., 65 USPQ2d 1051, 1053 (Fed. Cir. 2002)

As an example, the Examiner cited three references in the First Office Action in this case, including U.S. Pat. No. 5,596,879 issued January 28, 1997, to Burkhart , et al. (the '879 patent). Claim 1 of the '879 patent includes the limitation " installing a refrigerant line muffler in the refrigerant discharge line at a distance n(.lambda./4) from the compressor discharge to *thereby substantially eliminate acoustical resonances* downstream from the muffler." [Emphasis added] Thus, the usage of the word "substantially" would be understood by one skilled in the art to reasonably describe the subject matter of Applicants' invention, and is not indefinite. To the contrary, the scope of a claim using the term "substantially" is understood to those skilled in the art of acoustic vibration.

For the reasons cited above, Applicants believe that the claims are not indefinite, and specifically, that the term "substantially" does not render the claims indefinite for the reasons set forth. Reconsideration and allowance of same are requested.

Ground 3

The Examiner rejected the amendment filed May 21, 2007 under 35 U.S.C. 132(a) because it introduces new matter into the disclosure.

The Examiner states:

> The added material which is not supported by the original disclosure is as follows: determining or configured to determine "the rotational speed and the phase of operation of each compressor of the at least two compressors based on the sensed pressure pulses" (amended claims 1 and 5 and new claim 8). The applicant argues that the above material was added "to clarify that the control means is controlling the rotational speed and the phase of operation of the at least two compressors based on the sensed pressure pulses" (Remarks filed May 21, 2007, p. 9, ll. 28-30). However, this material was only added to the claims, and the specification contradicts this material in that the specification continuously indicates that a sensor senses the rotational speed and phase of operation of each of the compressors (first mentioned in the specification, pg. 3, ll. 2-3). Prior to the

amendment filed on May 21, 2007 no part of the disclosure indicated that the rotational speed and the phases of operation were determined based on the sensed pressure pulses.

Applicant is required to cancel the new matter in the reply to this Office Action.

For the reasons set forth above with respect to 35 U.S.C. §112, First Paragraph, Applicants submit that the previous amendment to the claims to include "rotational speed and the phase of operation of each compressor of the at least two compressors based on the sensed pressure pulses", is fully supported by the specification and drawings. No new matter was added as a result of the said amendments. Applicants respectfully request that the Examiner's rejection under 35 U.S.C. §132(a) be withdrawn and claims 1- 8 be allowed.

In the Final Office Action, the Examiner indicated that claims 1-8 would be allowable if rewritten to overcome the rejections under 35 U.S.C. 112, 1st and 2nd paragraphs, set forth in the Final Office Action. The Examiner stated: "the prior art does not teach, in combination with the other limitations of the first and third independent claims, shifting the phase of operation of at least one compressor of the at least two compressors so that outlet pressure pulses operatively produced by the at least two compressors are evenly spaced." However, it is unclear to Applicants how one would overcome the rejections under 35 U.S.C. 112, 1st and 2nd paragraphs, as the Examiner had already, in the preceding paragraphs of the Final Office Action, rejected the Applicants arguments presented to overcome both such rejections.

SUMMARY AND CONCLUSION

Applicant asks that the Board reverse the rejections.

The Commissioner is authorized to charge any fees determined to be due to the undersigned's Account No. 50-1059.

Respectfully submitted,

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Dated: January 15, 2008

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APPENDIX I

Copy of Claims Involved in the Appeal

1. A method for attenuating noise in at least one heating or cooling system, comprising:

providing at least two compressors selectably controlling the rotational speed and the phase of operation of each compressor of the at least two compressors;

sensing pressure pulses associated with each compressor of the at least two compressors;

determining the rotational speed and the phase of operation of each compressor of the at least two compressors based on the sensed pressure pulses;

controlling the rotational speed of the at least two compressors at a predetermined rotational speed that is substantially the same for each of the at least two compressors; and

shifting the phase of operation of at least one compressor of the at least two compressors so that outlet pressure pulses operatively produced by the at least two compressors are substantially evenly spaced.

2. The method of claim 1 wherein the step of shifting the phase of operation is performed in order to produce a composite pressure pulse frequency higher than the frequency of each compressor.

3. The method of claim 1 wherein the step of shifting the phase of operation is performed in order to produce a composite pressure pulse frequency that is a factor of "n" times higher than the frequency of each compressor, "n" being a total number of the at least two compressors.

4. The method of claim 1 wherein in the at least two compressors are screw compressors.

5. A system for attenuating noise in at least one heating or cooling system comprising:

at least two compressors;

a means of control for selectably controlling the rotational speed and the phase of operation of each compressor of the at least two compressors;

a sensing means for sensing pressure pulses associated with each compressor of the at least two compressors;

the means of control configured to determine the rotational speed and the phase of operation of each compressor of the at least two compressors based on the sensed pressure pulses, and to control:

the rotational speed of the at least two compressors at a predetermined rotational speed that is substantially the same and

the phase of operation of the at least two compressors so that outlet pressure pulses operatively produced by the at least two compressors are substantially evenly spaced.

6. The system of claim 5 wherein the means of control is a variable speed drive.

7. The system of claim 5 wherein the means of control for each compressor of the at least two compressors is a variable speed drive.

8. A method for attenuating noise in at least one heating or cooling system, the steps comprising:

providing at least two compressors;

selectably controlling the rotational speed and the phase of operation of each of the at least two compressors;

sensing pressure pulses associated with each compressor;

determining the rotational speed and the phase of operation of each of the at least two compressors based on the sensed pressure pulses;

controlling by the means of control the rotational speed of the at least two compressors at a predetermined rotational speed that is substantially the same for each of the at least two compressors; and

shifting the phase of operation of at least one compressor of the at least two compressors so that outlet pressure pulse pulses operatively produced by each of the at least two compressors are substantially evenly spaced;

wherein the composite pressure pulse frequency is a factor of "n" times higher than the frequency between successive outlet pulses of each compressor, "n" being a total number of the at least two compressors.

APPENDIX II

Evidence Entered and Relied Upon in the Appeal

None.

APPENDIX III

Related Proceedings

Applicant is not aware of any related proceedings.